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Title of symposium:

**Endurance performance: The role of self-regulation processes**

**Chair: Carla Meijen, University of Kent, United Kingdom**

**Co-chair: Samuele Marcora, University of Kent, United Kingdom**

Regulatory processes such as decision-making, pacing strategies, perception of effort, and mental fatigue have been identified as factors that can influence endurance performance, however a gap remains in research examining moderating variables such as perceived effort and motivation. This symposium will discuss the influence of these variables on endurance performance and the potential to inform psychological skills interventions.

First, Marcora (University of Kent) will present findings of research examining the influence of perception of effort and potential motivation in endurance performance. Next, focusing on pacing, Micklewright (University of Essex) will discuss the role of dual-process theories in decision-making processes in endurance situations. Following on from this, Meijen (University of Kent) will outline psychological demands that recreational endurance athletes may experience across a range of endurance activities. Finally, Brick (Ulster University) will present their findings of the effects of self-controlled and externally-controlled paced tasks on attentional focus and running performance.

**The limits to endurance performance: mind over muscle?**

**Samuela Marcora**

University of Kent, United Kingdom

Traditionally it has been assumed that performance during endurance exercise (e.g., prolonged running) is limited by muscle fatigue. In other words, it has been assumed that humans stop endurance exercise or slow down when their fatigued neuromuscular system is no longer capable of producing the required speed/power despite their maximal voluntary effort (task failure). As a result most research on the factors determining endurance performance has focused on the central and peripheral mechanisms of muscle fatigue. However, in recent years, various lines of evidence suggest that endurance performance is not limited by muscle fatigue and that a significant neuromuscular and metabolic reserve exists at exhaustion. Instead, endurance exercise seems to be limited by a decision-making process (task disengagement) based on perception of effort and potential motivation as predicted by motivational intensity theory. The applied implications of these findings for how endurance athletes train and prepare for competitions will be discussed.

## **Judgement and Decision-Making in Athletic Pacing: Intuition or Hypothetical Thinking?**

**Dominic Micklewright**

University of Essex, United Kingdom

Pacing decisions in endurance athletics are difficult because of complex factors that can change during an event. Most theoretical models of athletic performance and pace emphasise perceived exertion and prior experience as influencing decisions. However, little is known about the attention, information-processing and decision-making mechanisms that lead to pacing decisions. Dual-process theories propose that decision-making is informed by two types of thinking: i) fast-thinking which is pre-attentive, requires little cognitive effort and is intuitive; ii) slow-thinking which involves effortful mental simulation and analytical reasoning of a number of possible scenarios. Dual-process theories offer useful insights about athletic decision-making processes. For instance, as athletes become more experienced it may be that pacing decisions are based more on fast intuitive thinking rather than slow analytical thinking. Several eye-tracking studies will be presented showing the way athletes select and use information to make pacing decisions differs with experience and progression during an event.

## **Psychological demands in endurance performance: Shared experiences of recreational endurance athletes**

**Carla Meijen**

University of Kent, United Kingdom

*Co-author: Alister McCormick, University of Kent, United Kingdom*

*Co-author: Samuele Marcora, University of Kent, United Kingdom*

We aimed to identify psychological demands that are commonly experienced by recreational athletes of various endurance sports, distances, and competitive levels away from the competitive environment, preceding an event, or during an event. Four focus groups were held. Inductive thematic analysis resulted in the identification of seven themes; time investment and lifestyle sacrifices; commitment to training sessions; concerns about optimising training; pre-event stressors; exercise sensations; optimising pacing; and remaining focused despite adversity. The potential of designing psychological skills interventions aimed at managing these demands will be discussed, particularly in terms of regulation processes such as emotion control.

## **Altering Pace Control and Pace Regulation: Attentional Focus Effects during Running**

**Noel Brick**

University of Limerick, Ireland

*Co-author: Mark J. Campbell, University of Limerick, Ireland*

*Co-author: Richard S. Metcalf, Ulster University, Ireland*

*Co-author: Jacqueline L. Mair, Ulster University, Ireland*

*Co-author: Tadhg E. MacIntyre, University of Limerick*

The primary aim was to investigate the effects of manipulating perception of pace control on attentional focus, physiological, and psychological outcomes. A secondary aim was to determine the reproducibility of self-paced running when regulated by effort perceptions. Twenty endurance runners completed four 3 km time-trials; two self-controlled (SC) pace, one perceived exertion clamped (PE), and one externally-controlled (EC) pace time-trial. Subjects reported a greater focus on relaxing and optimizing running action during EC than SC. Mean heart rate was 2% lower during EC than SC. Increased internal sensory monitoring coincided with elevated effort perceptions in some subjects during EC, and a 10% slower completion time for PE than SC. External control over pacing may facilitate performance when runners engage attentional strategies conducive to improved running efficiency. Regulating pace based on effort perceptions alone may result in excessive monitoring of bodily sensations and a slower running speed.